CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

TENTATIVE MONITORING AND REPORTING PROGRAM NO. R5-2015-012-___

FOR

IN-SITU GROUNDWATER REMEDIATION

BEALE AIR FORCE BASE
YUBA COUNTY

The Air Force Civil Engineer Center (AFCEC) plans to remediate site groundwater impacted by historical releases of diesel-range petroleum hydrocarbons at the Beale Air Force Base medical clinic (Site TU509) in Yuba County, California. The Discharger proposes to inject Oxygen Release Compound - Advanced (ORC-A) into the subsurface to enhance bioremediation of the diesel-impacted groundwater.

This Monitoring and Reporting Program (MRP) describes requirements for monitoring the progress of enhanced bioremediation and compliance with groundwater limitations. This MRP is issued pursuant to Water Code Section 13263. The Discharger shall not implement any changes to this MRP unless and until a revised MRP is issued by the Executive Officer. As appropriate, California Regional Water Quality Control Board, Central Valley Region (Central Valley Water Board) staff shall approve sample station locations prior to implementation of sampling activities.

GROUNDWATER MONITORING

ORC-A will be injected into: 1) horizontal perforated pipes installed along the bottom of a remedial excavation prior to backfilling, and 2) into vertical borings along two transects oriented perpendicular to the groundwater flow direction containing borings drilled to a depth of about 40 feet below ground surface (bgs). Up to three injection events are anticipated.

There are 13 monitoring points associated with the proposed injection area (treatment area) at Site TU509. The groundwater monitoring program for these wells and any additional wells installed subsequent to the issuance of this MRP to augment monitoring of in situ remediation shall be sampled according to the schedule in Table 1 and the samples analyzed by the methods in Table 2.

Sample collection and analysis shall follow standard EPA protocol and sample analyses shall be completed by a California State-certified laboratory. All samples should be representative of the volume and nature of the discharge or matrix of material sampled. The time, date, and location of each sample shall be recorded on the sample chain of custody form.

Table 1: Site TU509 Sampling Program

Target Parameters[1]	Monitoring Events[3]	Well Number[2]
VOCs, TPH-D, TDS, Cr^{+6}	Performance Monitoring Semiannually	MW-1A, MW-1B, MW-2A, MW-2B, MW-6A, MW-6B
VOCs, TPH-D, TDS, Cr^{+6}	Transition Monitoring Semiannually	MW-7A, MW-7B, HUST012AMW, HUST012BMW, BCC014AMW, BCC014BMW
VOCs, TPH-D, TDS, Cr^{+6}	Compliance Monitoring Semiannually	BCC012AMW, BCC012BMW, BCC013AMW, BCC013BMW, BCC016MW
Groundwater Elevation	Semiannually	BCC010AMW, BCC010BMW, BCC011AMW, BCC011BMW,

1 VOCs = volatile organic compounds; TPH-D = total petroleum hydrocarbons as diesel; Cr^{+6} = hexavalent chromium, TDS = total dissolved solids.

2 Well numbers as shown on Figure 2.

3 Any sampling done more frequently than specified in Table 1 shall also be reported to Central Valley Water Board staff.

Table 2: Analytical Methods and Constituent Suite

Parameters	EPA Analytical Method	Maximum Practical Quantitation Limit [1]
VOCs	EPA 8260B	0.5 µg/L
TPH-D	EPA 8015	100 µg/L
TDS	EPA 160.1	50 mg/L
Cr^{+6}	EPA 7199 or 218.6	1 µg/L

[1] All concentrations between the Method Detection Limit and the Practical Quantitation Limit shall be reported as an estimated value.

FIELD SAMPLING

In addition to the above sampling and analysis, field sampling and analysis shall be conducted each time a monitor well or injection well is sampled. The sampling and analysis of field parameters shall be as specified in Table 3.

Table 3: Field Sampling Requirements

Parameters	Units	Type of Sample
Groundwater elevation	Feet, Mean Sea Level	Measurement
Oxidation-reduction potential	Millivolts	Grab
Electrical conductivity	µhmos/cm	Grab
Dissolved oxygen	mg/L	Grab
pH	pH Units (to 0.1 units)	Grab
Temperature	^{o}C	Grab
Volume purged	Gallons	Measurement

Field test instruments (such as those used to test pH and dissolved oxygen) may be used provided that:

1. The operator is trained in proper use and maintenance of the instruments;
2. The instruments are calibrated prior to each monitoring event;
3. Instruments are serviced and/or calibrated by the manufacturer at the recommended frequency; and
4. Field calibration reports are submitted as described in item (b) of the "Reporting" section of this MRP.

DISCHARGE MONITORING

The Discharger shall monitor daily the discharge of water and amendments that are injected into the groundwater according to the requirements specified in Table 4. Each amendment addition shall be recorded individually, along with information regarding the time period over which the amendment was injected into the aquifer.

Table 4: Discharge Monitoring Requirements

Parameters	Units	Type of Sample
Injected volume	gallons per day	Meter
Amendment(s) added	kilograms per day	Measured

AMENDMENT ANALYSIS

ORC-Advanced is an oxygen release compound composed primarily of calcium oxy-hydroxide and calcium hydroxide. It is commonly used in Region 5. Analysis of ORC-A has previously been performed, and received by the Water Board. Toxic impurities are not expected. Amendment analysis is not required.

ESTABLISHMENT OF BASELINE CONCENTRATION VALUES

The Discharger shall develop baseline values for concentrations of hexavalent chromium and TDS in groundwater following the procedures found in CCR Section 20415(e) (10). The Discharger shall complete at least one pre-injection monitoring event to establish baseline groundwater quality conditions. The processing of the baseline data shall be in accordance with the Attachment B to the Notice of Intent.

REPORTING

When reporting the data, the Discharger shall arrange the information in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner as to illustrate clearly the compliance with this Order. The results of any monitoring done more frequently than required at the locations specified in the Monitoring and Reporting Program shall also be reported to the Central Valley Water Board.

As required by the California Business and Professions Code Sections 6735, 7835, and 7835.1, all reports shall be prepared by a registered professional or their subordinate and signed by the registered professional.

After baseline monitoring, the Discharger will submit a Baseline Monitoring Report documenting baseline sampling activities and analytical results. Post-injection monitoring results will be submitted in semiannual reports. After completion of injection activities, the Discharger shall submit a Remedial Action Summary Report. All reports shall be submitted electronically over the internet to the Geotracker database and shall conform to the requirements of the California Code of Regulations, Title 23, Division 3, Chapter 30.

Semiannual reports shall be submitted by the 1st day of the second month following the end of each semiannual event (**1 June and 1 December)** or a date approved in writing by Central Valley Water Board staff, until such time as the Executive Officer determines that the reports are no longer necessary. Each report shall include the following minimum information or reference the current Progress Report that contains this information:

(a) a description and discussion of the groundwater sampling event and results including an evaluation of trends in the concentrations of TPH-D.

(b) field logs that contain, at a minimum, water quality parameters measured before, during, and after purging, method of purging, depth of water, volume of water purged, and groundwater elevations in the wells, etc.;

(c) groundwater elevation contour maps;

(d) TPH-D concentration maps;

(e) cumulative data tables containing the water quality analytical results; and

(f) a copy of the laboratory analytical data report, which may be submitted in an electronic format.

The Remedial Action Summary Report shall be submitted to the Central Valley Water Board within 90 days following completion of injection activities. This report shall contain an evaluation of the effectiveness of in situ remediation. The Remedial Action Summary Report shall contain the following minimum information:

(a) a description of injection activities including quantities of water and amendments injected into the groundwater, along with time period over which the amendments were injected into the aquifer;

(b) both tabular and graphical summaries of all data obtained during the year;

(c) groundwater contour maps and TPH-D concentration maps containing all data obtained during post-injection monitoring;

(d) a discussion of the long-term trends in the concentrations of TPH-D, TDS, and Cr^{+6} in the groundwater monitoring wells;

(e) a description of all remedial activities conducted during the year, an analysis of their effectiveness in removing the pollutants, and plans to improve the remediation system effectiveness;

(f) an identification of any data gaps and potential deficiencies/redundancies in the monitoring system or reporting program along with recommendations for improvement; and

(g) discussion of any contingency measures that were triggered during the post-injection monitoring.

A letter transmitting the monitoring reports shall accompany each report. Such a letter shall include a discussion of requirement violations found during the reporting period, and actions taken or planned for correcting noted violations, such as operation or facility modifications. If the Discharger has previously submitted a report describing corrective actions and/or a time schedule for implementing the corrective actions, reference to the previous correspondence will be satisfactory. The transmittal letter shall contain the penalty of perjury statement by the Discharger, or the Discharger's authorized agent, as described in the Standard Provisions General Reporting Requirements Section B.3.

The Discharger shall implement the above monitoring program on the first day of the month following adoption of this Order.

Ordered by:

PAMELA C. CREEDON, Executive Officer

(Date)